

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5185	1	11
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
45222.1.1	HPP-0401(207)	P.E.	
45222.2.1		RW & Utility	
45222.3.1	HPP-0401(218)	Const.	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	8+75 TO 64+57	4-8	9-11	

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 45222.1.1(R-5185) F.A. PROJ. HPP-0401(207)
COUNTY HARNETT
PROJECT DESCRIPTION WIDENING OF US 401 IN LILLINGTON
FROM NC 210 TO NORTH OF SR 1436 (MATTHEWS RD.)

INVENTORY

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

ID: R-5185

C202597

CONTRACT:

PERSONNEL

C.D. CZAJKA

J.R. TURNAGE

H.R. CONLEY

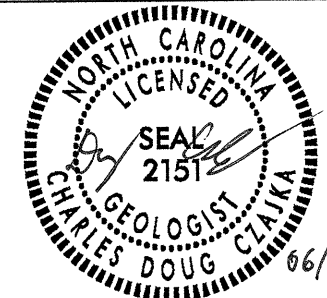
J.R. MATULA

INVESTIGATED BY C.D. CZAJKA

CHECKED BY N.T. ROBERSON

SUBMITTED BY C.D. CZAJKA

DATE JUNE 2010



DRAWN BY: T.T. WALKER, C.D. CZAJKA

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

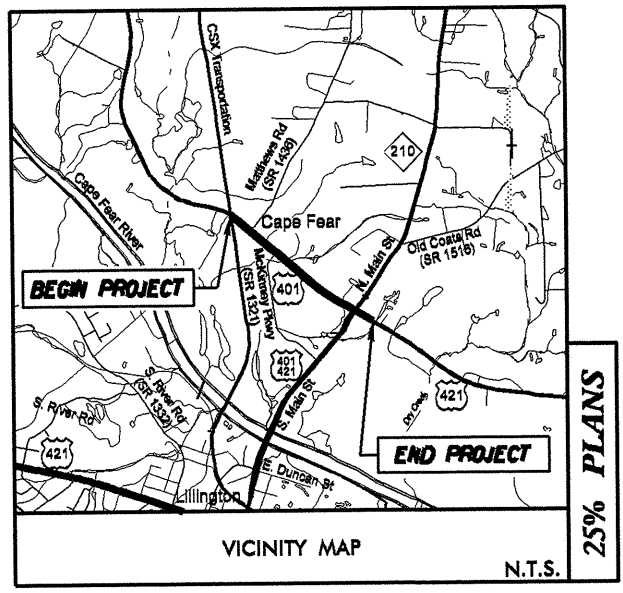
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 45222.1.1(R-5185) SHEET NO. 2

Main content table with columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS. Includes sub-sections like SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, MISCELLANEOUS SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, and INDURATION.

TIP PROJECT: R-5185

See Sheet 1A For Index of Sheets
See Sheet 1B For Standard Symbology Sheet



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

HARNETT COUNTY

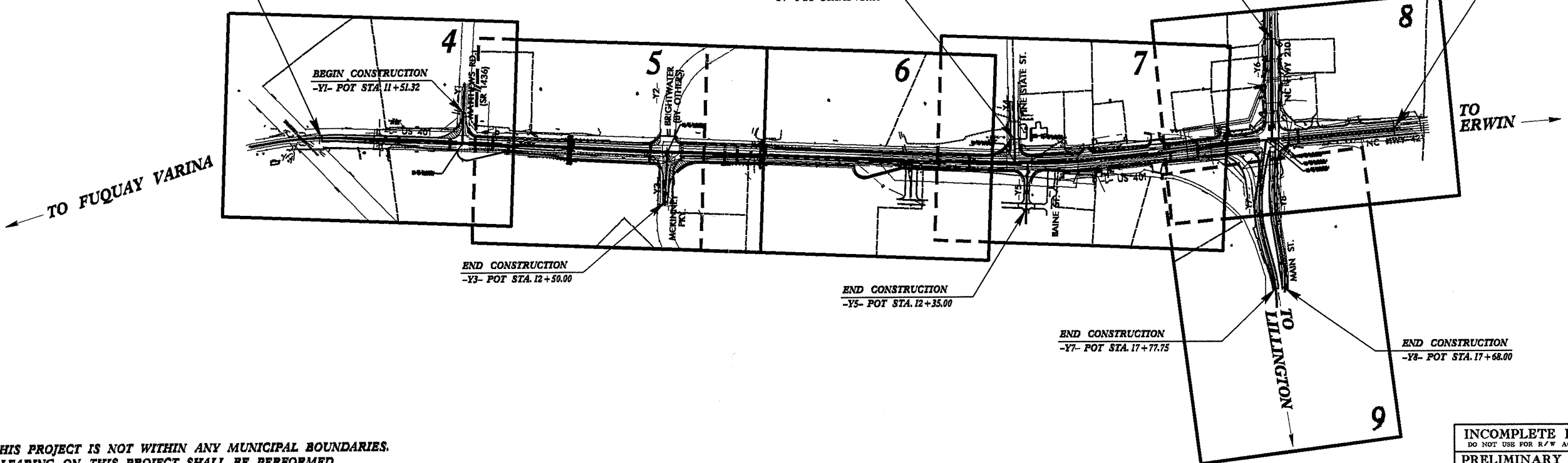
LOCATION: US 401 IN LILLINGTON FROM NC 210
TO NORTH OF SR 1436

TYPE OF WORK: GRADING, PAVING, DRAINAGE, CULVERTS,
SIGNALS, & SIGNING

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5185	2A	11
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
45222.1.1	HPP-0401(207)	P.E.	

NC GRID
NAD 83 / NSRS 07

BEGIN TIP PROJECT R-5185
-L- STA. 8+75.00

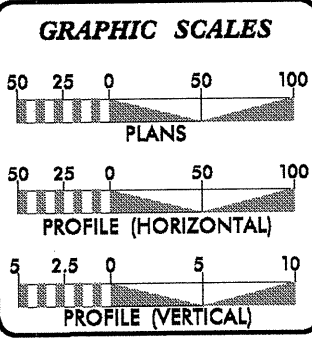


END TIP PROJECT R-5185
-L- STA. 64+57.00

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED
TO THE LIMITS ESTABLISHED BY METHOD III.

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

CONTRACT:



DESIGN DATA

ADT 2009 =	11,000
ADT 2030 =	20,500
DHV =	N/A
D =	N/A
T =	N/A
V =	50 MPH
FUNC. CLASS:	RURAL ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5185	=	1.06 Miles
TOTAL LENGTH TIP PROJECT R-5185	=	1.06 Miles

NCDOT CONTACT: JERRY BRADLEY
Project Engineer - Division 6 Project Manager

Prepared in the Office of:
ST/RALPH WHITEHEAD ASSOCIATES, INC.
1000 West Morehead St., Ste. 200, Charlotte NC, 28208
NC License Number F-0991
FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JUNE 18, 2010

LETTING DATE: JULY 20, 2011

JOSEPH A. FREEMAN, PE
PROJECT ENGINEER

MAAMOON ABDELAZIZ
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER P.E.



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

June 16, 2010

STATE PROJECT: 45222.1.1 (R-5185)
FEDERAL PROJECT: HPP-0401(207)
COUNTIES: Harnett
DESCRIPTION: Widening of US 401 from NC 210 to just North of SR 1436 (Matthews Road)

SUBJECT: Geotechnical Report - Inventory

Project Description

This project consists of a proposed 1.09 mile widening of the existing 2 and 3-lane segments of US 401 to a four-lane, grass median-divided roadway.

The geotechnical investigation was conducted during April of 2010 by the NCDOT Geotechnical Engineering Unit. All borings were advanced using a CME-550 drill machine with an automatic hammer. Standard Penetration and Solid Auger methods were used to advance borings to necessary depths. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by the Materials and Tests Unit.

The following alignments, totaling 1.09 miles, were investigated. Subsurface profiles of these alignments are included in this report.

<u>Line</u>	<u>Stations</u>
-L-	8+75 to 64+57

Areas of Special Geotechnical Interest

- 1) Highly Plastic Clays: Coastal Plain clays with high plasticity indices ($PI \geq 26$), which may cause problems during construction, were encountered at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L-	20+00	40 RT
-L-	26+00	40 RT
-L-	28+50	80 LT
-L-	37+50	75 RT
-L-	40+00	40 RT

-L- 43+00 40 RT

- 2) Loose/Soft Soils: Soils with "soft" or "very loose" densities ($n\text{-value} < 4$) were encountered on the project and may impact subgrade or embankment construction. These soils were found at the following locations:

<u>Line</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-L-	11+50	22 LT
-L-	17+00	52 RT
-L-	20+00	40 RT
-L-	31+00	30 RT
-L-	31+64	20 RT

- 3) Organic Soils: The following sections were found to contain soils with organic content greater than 3%:

<u>Line</u>	<u>Station</u>	<u>Offset (ft)</u>
-L-	50+00	50 LT

Physiography and Geology

The project is located in the town of Lillington. The terrain is relatively flat and the project corridor consists primarily of businesses with a few homes. Two small tributaries of the Cape Fear River cross the project corridor.

Geologically, the project is located on the edge of the Coastal Plain and Raleigh Belt. Surficial soils consist of Cretaceous Coastal Plain sands and silts of the Middendorf Formation. The Coastal Plain soils are underlain by residual soils derived from the weathering of phyllite from the Raleigh Belt.

Soil Properties

Soils encountered during this investigation include roadway embankment, alluvial sediments, Coastal Plain soils and residual soils.

Roadway Embankment soils are present in the existing roadway. These soils consist of brown, orange, and red, dry to moist, medium dense, silty sand and clayey sand (A-2-4, A-2-6).

Alluvial soils are present in the vicinity of tributaries leading to the Cape Fear River as well as near the intersection of US 401 and NC 210. These soils consist primarily of dark gray to gray, moist to wet, soft to stiff, sandy silt (A-4) and moist to saturated, very loose to medium dense, coarse sand (A-1-b).

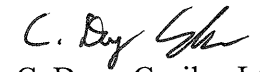
Coastal Plain soils are deposited over residual soils of the Raleigh Belt. The Coastal Plain soils consist primarily of gray, orange, brown and red, moist to wet, very soft to very stiff, sandy silt (A-4) and gray, red and orange, dry to wet, soft to hard, sandy and silty clay (A-6, A-7-6). Minor amounts of gray, red, brown and orange, dry to saturated, loose to medium dense, silty and clayey sand (A-2, A-2-7) are also present.

Residual soils are derived from the in-place weathering of the underlying phyllitic bedrock of the Raleigh Belt. Where encountered, these soils consist of brown, moist, stiff, clayey silt (A-5).

Groundwater

Groundwater was encountered in most borings throughout the project corridor. Groundwater is generally shallow across the project and occurs within 10.0 feet of the ground surface. Where encountered, 24 hour water readings ranged from 1.6 to 9.6 feet below the ground surface.

Prepared by,



C. Doug Czajka, LG
Engineering Geologist

EARTHWORK BALANCE SHEET

PROJECT: R-5185

COUNTY: Harnett

Volumes in Cubic Yards
DATE: 3/8/11

COMPILED BY: STV

SHEET 1 OF 1 SHEETS 38/11

STATION	STATION	EXCAVATION					EMBANKMENT				BORROW	WASTE			
		TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	SUITABLE UNCLASS.	TOTAL	ROCK	EARTH	EMBANK. +25%		ROCK	SUITABLE	UNSUIT.	TOTAL
-L- 8+75.00 (RT)	-L-38+50.00 (RT)	248				248	17,084		17,084	21,355	21,107				
-DR1- 10+42.32	-DR1- 11+32.14	27				27	143		143	179	152				
-Y3- 10+54.76	-Y3- 12+50.00	47				47	374		374	468	421				
	SUBTOTAL	322				322	17,601		17,601	22,001	21,679				
-L- 38+50.00 (RT)	-L- 56+93.28 (RT)	222				222	5,400		5,400	6,750	6,528				
-Y9- 10+34.50	-Y9- 11+97.94	569				569							569		569
-Y5- 10+40.15	-Y5- 12+05.03	251				251	424		424	530	279				
-Y7- 10+59.81	-Y7- 17+77.75	155				155	51		51	64			91		91
-Y8- 10+54.86	-Y8- 17+68.00	375				375	91		91	114			261		261
	SUBTOTAL	1,572				1,572	5,966		5,966	7,458	6,807		922		922
-L- 8+75.00 (LT)	-L-38+50.00 (LT)	1,063				1,063	6,365		6,365	7,956	6,893				
-Y1- 10+13.12	-Y1-12+72.82	316				316	176		176	220			96		96
	SUBTOTAL	1,379				1,379	6,541		6,541	8,176	6,893		96		96
-L- 38+50.00 (LT)	-L- 58+21.00 (LT)	140				140	1,303		1,303	1,629	1,489				
-Y6- 10+40.00	-Y6- 14+95.72	50				50	49		49	61	11				
-L- 58+21.00 (LT)	-L- 65+36.40 (LT)	21				21	8		8	10			11		11
	SUBTOTAL	211				211	1,360		1,360	1,700	1,500		11		11
TOTAL		3,484				3,484	31,468		31,468	39,335	36,880		1,029		1,029
LOSS DUE TO CLEARING & GRUBBING		-200				-200					200				
ADDITIONAL UNDERCUT															
ROCK WASTE TO REPLACE BORROW															
ADJUST FOR ROCK WASTE															
WASTE IN LIEU OF BORROW											-1,029		-1,029		-1,029
PROJECT TOTAL		3,284				3,284	31,468		31,468	39,335	36,051				
EST. 5% TO REPLACE TOP SOIL ON BORROW PIT											1,803				
GRAND TOTAL						3,284	31,468		31,468	39,335	37,854				
SAY						3,300					40,000				
EST. DDE	2140 CY														
UNDERCUT EXCAVATION	650 CY														
SHALLOW UNDERCUT	300 CY														

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE DIVISION 6 DDC. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.



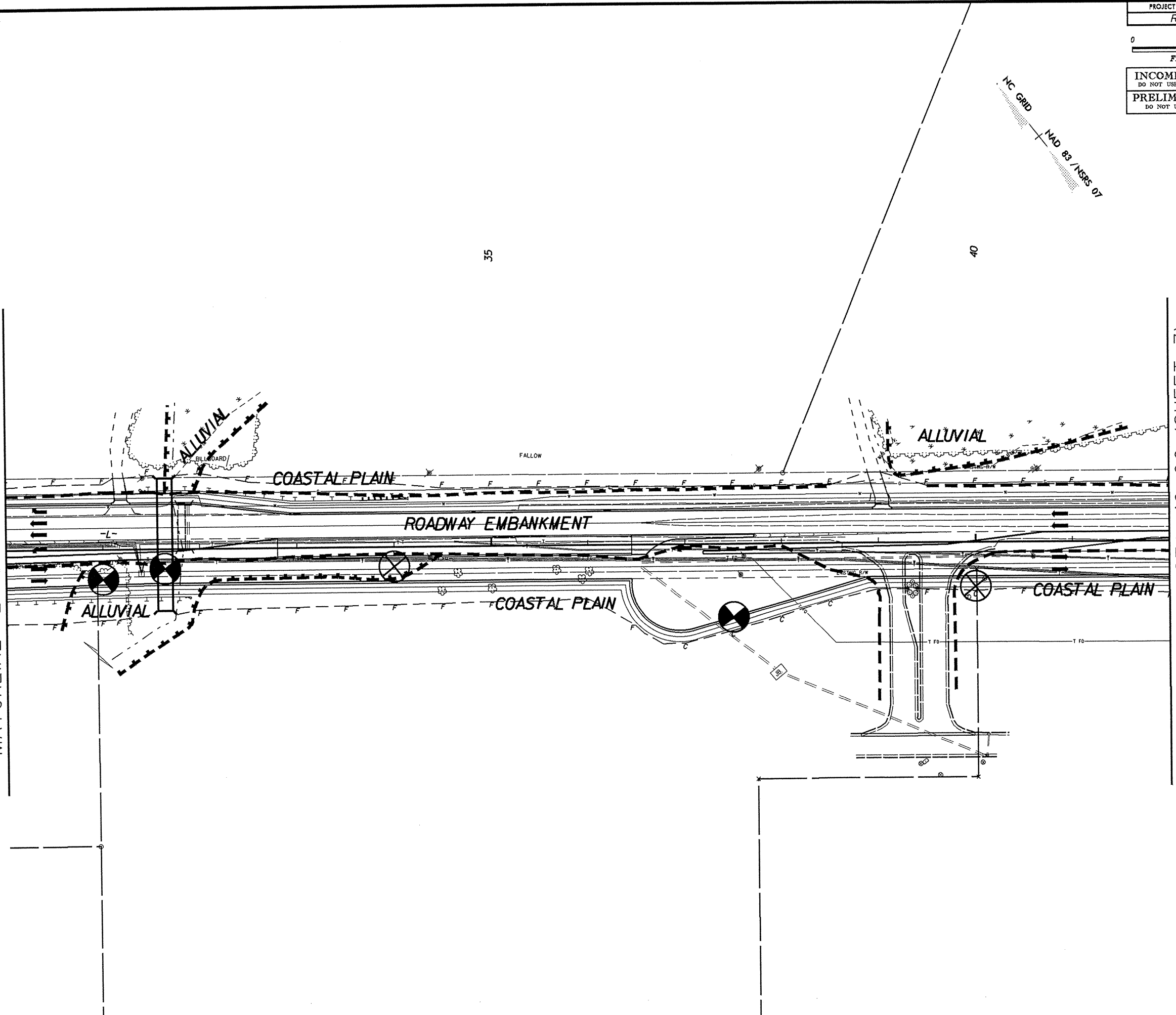
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

8/17/99

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MATCHLINE -L- STA 30+00 (SHEET 5)

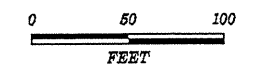
MATCHLINE -L- STA 42+00 (SHEET 7)



8/17/99

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R-5185	7

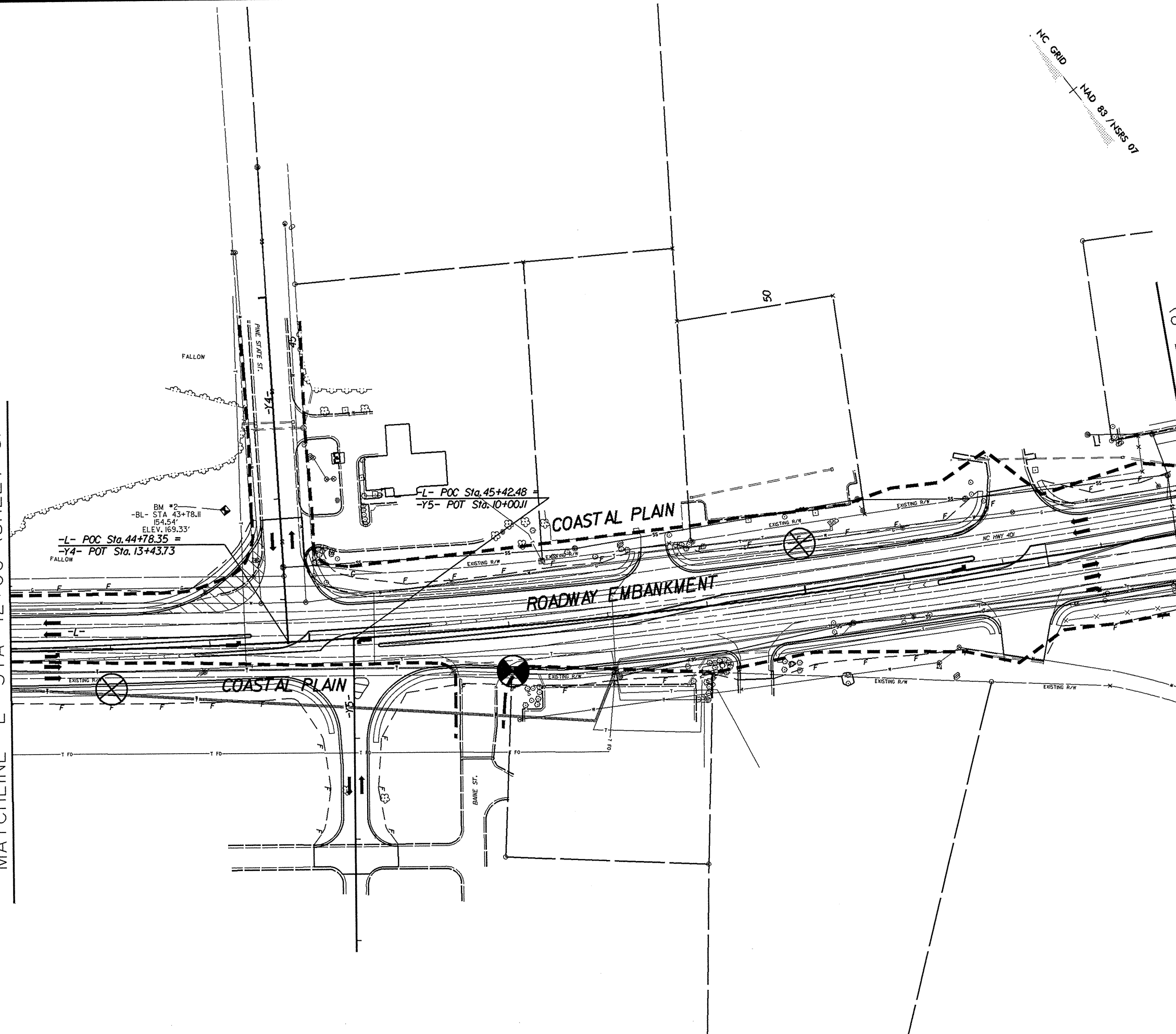


INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID
NAD 83 / NRS 07

MATCHLINE -L- STA 42+00 (SHEET 6)



MATCHLINE -L- STA 54+00 (SHEET 8)

8/17/99

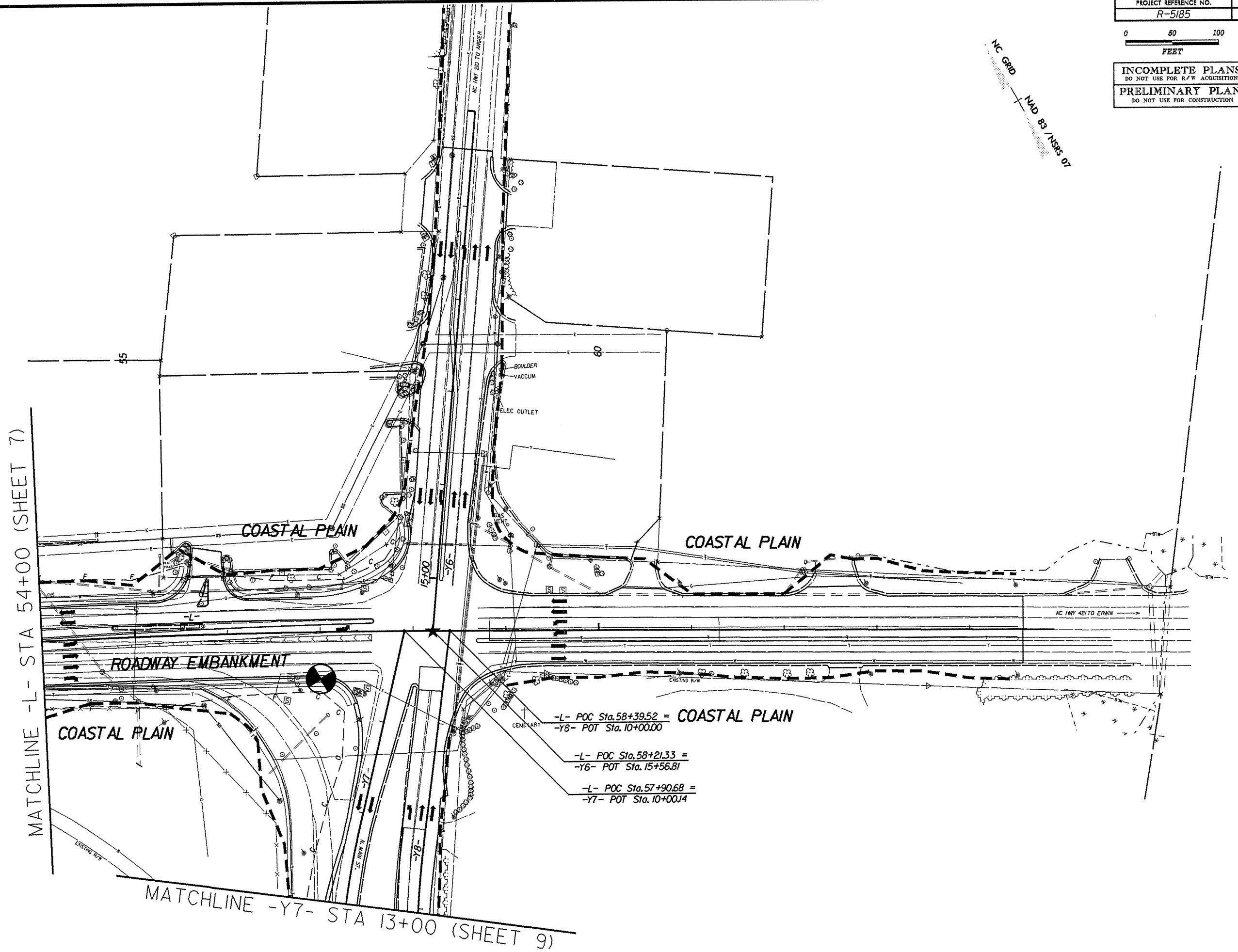
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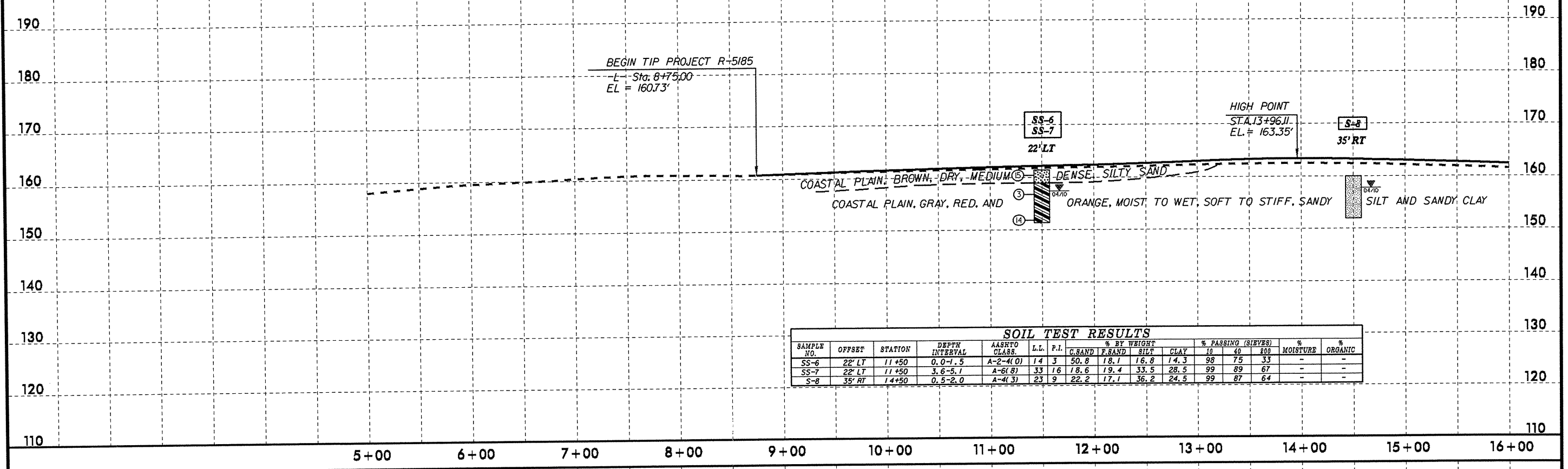


INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NC GRID
NAD 83 / NRS 07

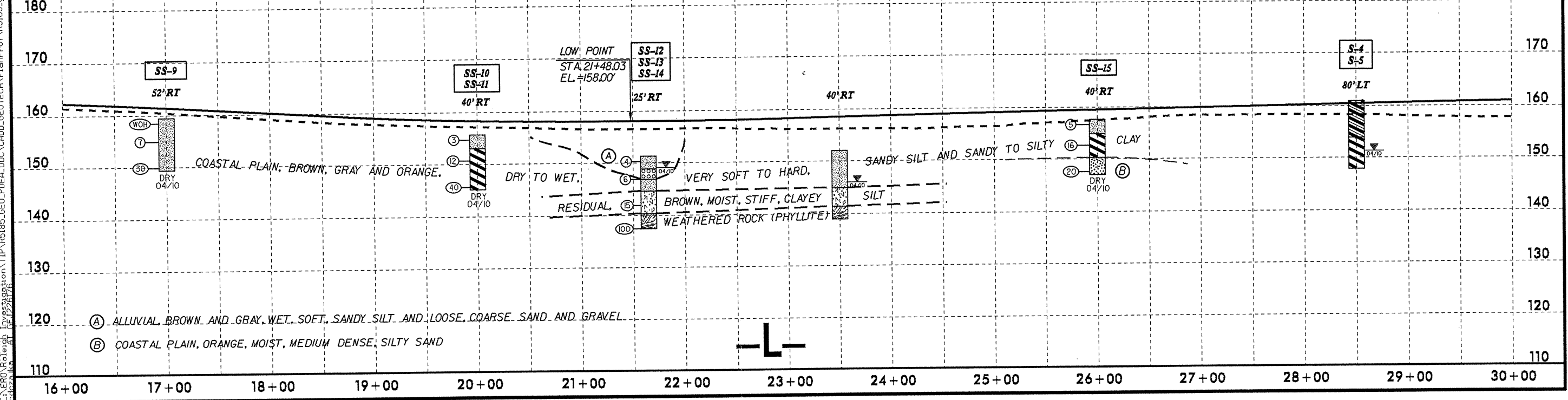


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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.BAND	F.BAND	SILT	CLAY	10	40	200		
SS-6	22' LT	11+50	0.0-1.5	A-2-4(0)	14	3	50.8	18.1	16.8	14.3	98	75	33	-	-
SS-7	22' LT	11+50	3.6-5.1	A-6(8)	33	16	18.6	19.4	33.5	28.5	99	89	67	-	-
S-8	35' RT	14+50	0.5-2.0	A-4(3)	23	9	22.2	17.1	36.2	24.5	99	87	64	-	-

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.BAND	F.BAND	SILT	CLAY	10	40	200		
SS-9	50' RT	17+10	0.0-1.5	A-4(3)	24	7	15.9	17.9	41.7	24.5	100	92	71	-	-
SS-10	40' RT	20+00	0.0-1.5	A-4(2)	23	9	24.9	22.2	28.4	24.5	97	85	56	-	-
SS-11	40' RT	20+00	4.0-5.5	A-7-6(16)	54	33	27.1	11.8	20.3	40.8	92	77	58	-	-
SS-12	25' RT	21+65	0.0-1.5	A-4(0)	20	6	37.9	23.4	22.3	16.3	91	74	38	-	-
SS-13	25' RT	21+65	4.3-4.8	A-4(0)	20	3	23.2	46.5	14.0	16.3	96	87	36	-	-
SS-14	25' RT	21+65	8.3-9.8	A-5(7)	43	5	5.3	16.9	67.6	10.2	100	98	86	-	-
SS-15	40' RT	26+00	0.0-1.5	A-4(0)	18	6	34.0	20.2	25.4	20.4	97	81	48	-	-
S-4	80' LT	28+50	1.0-2.5	A-6(4)	30	15	36.1	16.5	18.9	28.5	97	79	49	-	-
S-5	80' LT	28+50	7.0-8.5	A-7-6(12)	47	26	31.6	12.4	17.2	38.7	99	83	58	-	-

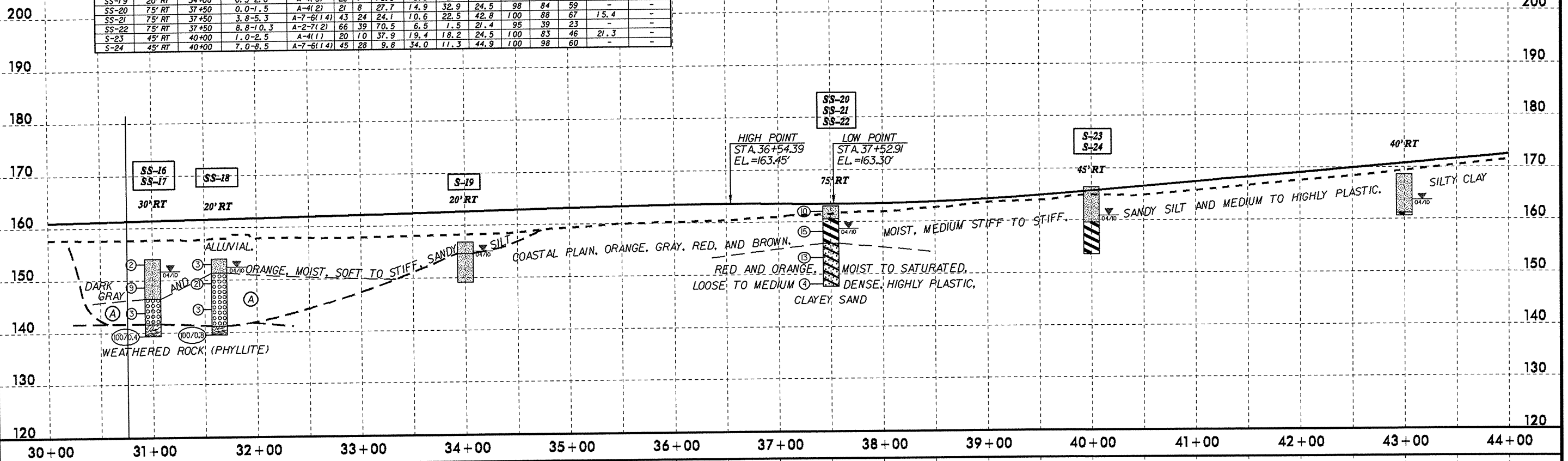


- (A) ALLUVIAL BROWN AND GRAY, WET, SOFT, SANDY SILT AND LOOSE, COARSE SAND AND GRAVEL
- (B) COASTAL PLAIN, ORANGE, MOIST, MEDIUM DENSE SILTY SAND

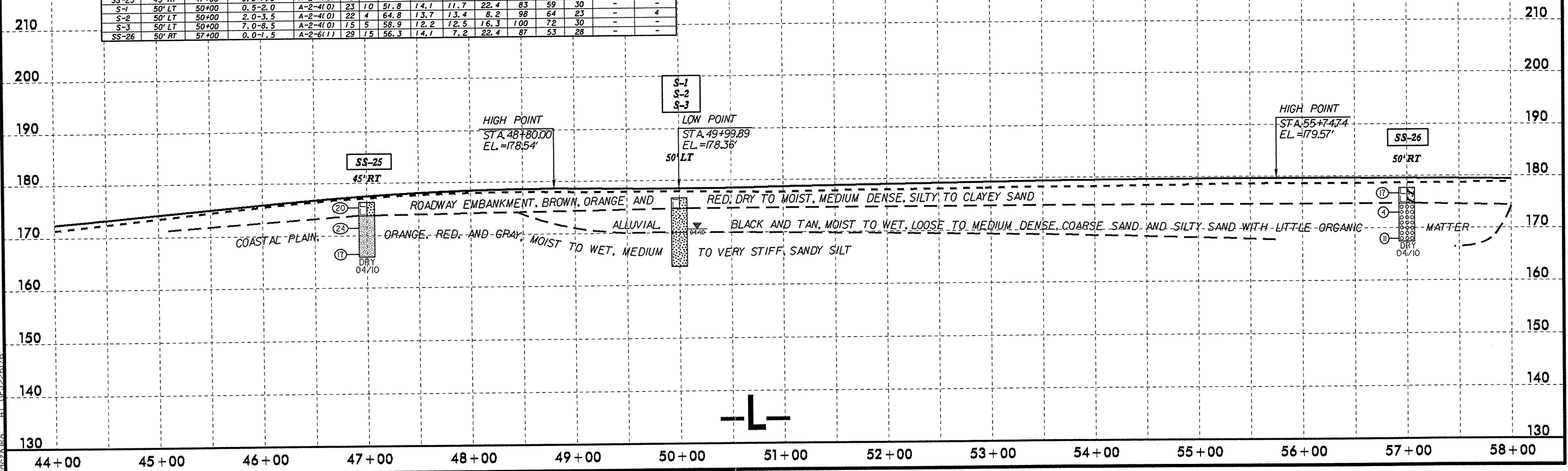
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-16	30' RT	31+00	0.0-1.5	A-4(0)	24	6	31.4	20.8	25.4	22.4	98	81	50	-	-
SS-17	30' RT	31+00	9.4-10.9	A-1-b(0)	22	NP	84.7	7.5	0.6	7.1	94	28	8	-	-
SS-18	20' RT	31+64	0.0-1.5	A-4(0)	25	4	30.2	26.7	28.8	14.3	96	86	46	-	-
SS-19	20' RT	34+00	0.5-2.0	A-4(3)	26	7	16.9	16.5	42.1	24.5	99	92	70	-	-
SS-20	75' RT	37+50	0.0-1.5	A-4(2)	21	8	27.7	14.9	32.9	24.5	98	84	59	-	-
SS-21	75' RT	37+50	3.8-5.3	A-7-6(14)	43	24	24.1	10.6	22.5	42.8	100	88	67	15.4	-
SS-22	75' RT	37+50	8.8-10.3	A-2-7(2)	66	39	70.5	6.5	1.5	21.4	95	39	23	-	-
S-23	45' RT	40+00	1.0-2.5	A-4(1)	20	10	37.9	19.4	18.2	24.5	100	83	46	21.3	-
S-24	45' RT	40+00	7.0-8.5	A-7-6(14)	45	28	9.8	34.0	11.3	44.9	100	98	60	-	-



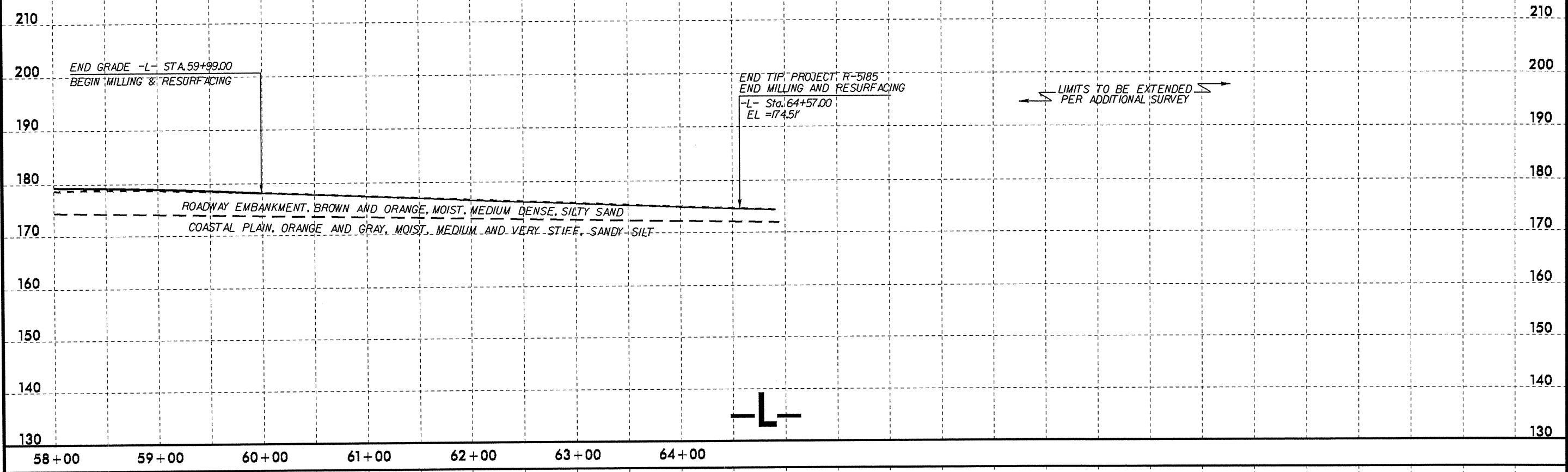
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-25	45' RT	47+00	0.0-1.5	A-2-4(0)	15	4	56.1	16.9	10.7	16.3	97	71	28	-	-
S-1	50' LT	50+00	0.5-2.0	A-2-4(0)	23	10	51.8	14.1	11.7	22.4	83	59	30	-	-
S-2	50' LT	50+00	2.0-3.5	A-2-4(0)	22	4	64.8	13.7	13.4	8.2	98	64	23	-	4
S-3	50' LT	50+00	7.0-8.5	A-2-4(0)	15	5	58.9	12.2	12.5	16.3	100	72	30	-	-
SS-26	50' RT	57+00	0.0-1.5	A-2-6(1)	29	15	56.3	14.1	7.2	22.4	87	53	28	-	-



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PROJECT REFERENCE NO. R-5158	SHEET NO. 11
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



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